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NOVEMBER 1958

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Waterflooding—A Factor in the Long Beach Harbor and Wilmington Operations

As Told to Ed Lundberg By
Henry Abadie, Petroleum Engineer, Long Beach Oil Development Company

Climaxing a $3,322,000 program of experiment and preparation dating back to 1953 at Long Beach, California, the Long Beach Oil Development Company has embarked upon the largest single oil-field waterflooding program in the nation.

Three pumping stations are employed to inject 120,000 barrels of brine daily into six producing horizons of four fault blocks in the Long Beach tidelands sector of the Wilmington oil field.

Against this accomplishment stands the plight of Long Beach Harbor which slowly and relentlessly is sinking, necessitating huge financial outlays to bulwark the port from intrusion by the sea.

A Theory on Subsidence

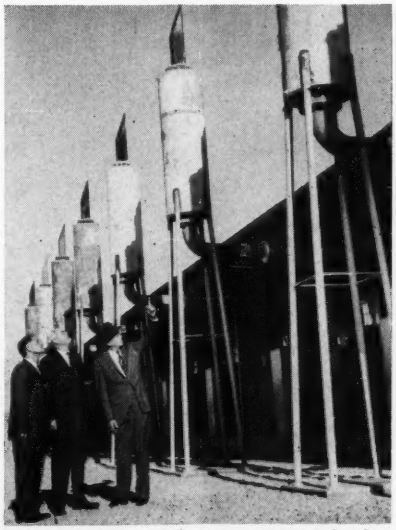
Maximum depth of subsidence at the port to date is 25 feet. The harbor land at the subsidence epicenter continues to sink at the rate of little less than one inch per month. When the subsidence will halt and how deep the sinking will reach are matters of conjecture.

One theory pertaining to the cause of subsidence holds that reduction of pressures in the producing horizons of the field, plus compaction of the oil sands following removal of fluids, have permitted the overburden to settle.

This theory points up pressure restoration as the great hope of slowing, and perhaps halting, the sinking of the port land. Oil has been produced at the harbor for 20 years.

It is interesting to note that Uncle Sam recently filed in Federal District Court in Los Angeles a suit against the operators in the Wilmington oil field. The government's suit demands a field-wide unitization of waterflooding and production as a means of halting the land subsidence at Long Beach Naval Shipyard, located on the eastern end of Terminal Island a short distance from the center of the so-called "subsidence bowl." This suit threatens an injunction terminating all field operations if such a unitized program is not forthcoming shortly. The suit alleges that "nothing has been done" to halt land subsidence at Long Beach.

However, neither the shadow of subsidence nor the legal and political furor which has engendered has been able to dim the effective engineering accomplishment in waterflooding the port field.



Exhaust stacks at the new water injection station on Pier A, Long Beach Harbor.

The LBOD Secondary Recovery Program

With reference to the efficacy of water injection in secondary recovery and pressure restoration it was first necessary to prove that this field would accept the injection of vast quantities of water. The emphasis on necessity of proof is seen as a timely reminder to those persons of less technical skill, albeit good intentions, whose voices have been raised in criticism of the pace at which the waterflooding program has been developed at Long Beach harbor. In the minds of the critics the waterflooding program probably means subsidence control.

In 1953 LBOD embarked upon the experimental phase of its water injection program at the port, utilizing a pilot plant located on the outer reaches of Pier B. To date more than 25,000,000 barrels of water have been injected.

Recently LBOD has completed two new water injection stations, one a million-dollar plant on Pier A, the other, about half as large, on Pier E, Terminal Island, in the vicinity of the Long Beach Naval Shipyard.

These two new facilities plus the pilot plant are capable of a maximum daily injection of 200,000 barrels, although the present daily rate is 60 per cent of potential.

It has been found necessary to proceed with caution, however, since the waterflooding operation is under close scrutiny by the state. Success or failure of the program will have a profound effect on the future of this great field.

Pressure restoration is the most critical feature of the waterflooding program. If pressures were drastically increased and caused a breakthrough, with the attending flooding out of any one of the producing wells, the state could order cessation of the entire program and require the pumping out of all the fluid that has been injected into the field horizons.

Up to the present time the success of the waterflooding program has far exceeded expectations.

Pilot plant operations were confined, in the main, to waterflooding the H-X sands of Fault Block V-b. Data pertaining to this phase of the waterflooding program show that:

(1) Since 1953 the pressure of the H-X sands under waterflood has risen to a present level of 1220 psi. This is higher than the first recorded pressure of 1080 psi in these sands, observed in 1951, and very nearly approximates the virgin pressure of the zone.

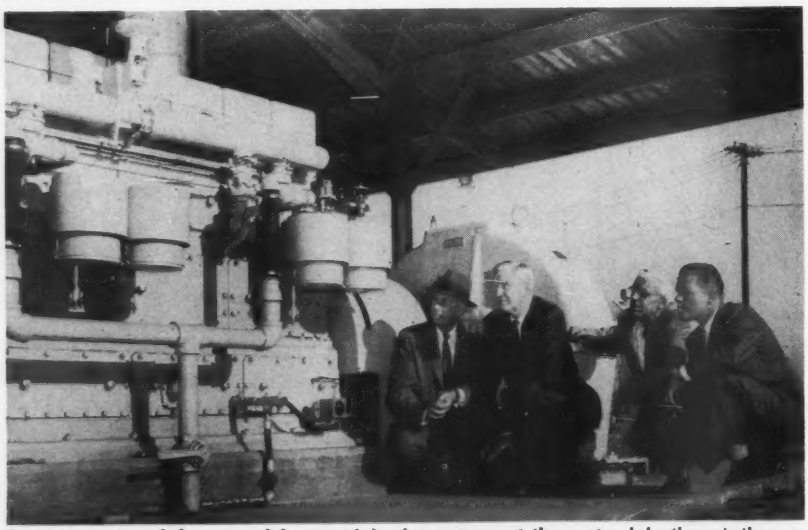
(2) From the standpoint of secondary recovery of oil from the H-X sands, it is estimated that 1,425,000 more barrels of oil have been produced than would have been realized without water injection, judging from extrapolation of the 1953 production curve.

The water injection program at Long Beach has been a joint effort of Long Beach Oil Development Company, Long Beach Harbor Department and special consulting engineers pooling their talents. The injection plants and distribution systems solve many local problems in addition to those arising from the waterflooding process alone.

A happy solution was found to one problem which has proved vexatious in waterflooding programs elsewhere in the nation—the location of ample source water for the injection operations. An unlimited supply of brine is at hand—in the ocean. The field water was analyzed and found to approximate closely the chemistry of ocean water. Holes were drilled into the salt sands of the ocean bottoms and there was discovered, at depths of 120-200 feet, highly filtered sea water which has proved ideal for waterflooding.

While the LBOD operation is the greatest single waterflood program in the nation today, it is little more than one-tenth the size of a planned program which calls for daily injection of one million barrels of brine if and when unitization agreements are consummated dealing with repressuring the entire Wilmington oil field.

View of the new water injection station on Pier A, Long Beach Harbor, showing the injection-water storage tanks, the shed housing the battery of water-injection pumps, and water-injection lines as they dip under the catwalk and carry brine into oil producing horizons.



Inspecting one of the powerful water injection pumps at the water injection station on Pier A, Long Beach Harbor are, left to right, Warren Johnson, Standard Oil Company of California; Joe Bishop, president of the Long Beach Harbor Commission; Frank J. Hardesty, chief petroleum engineer for the Long Beach Harbor Department; and Charles L. Vickers, port manager at Long Beach and an executive with the Long Beach Oil Development Company.

Editor's Note: A recent announcement by the Bureau of Mines, Department of the Interior, states that "Pumping water underground to force petroleum into producing wells halted a sharp decline in output at several wells and made possible greater ultimate recovery at one of the Nation's biggest oil fields.

"A new publication just released by the Department describes a Bureau engineering study of a waterflooding project in part of the Wilmington field in California's Los Angeles Basin. With approximately 3,000 active wells, this field is the State's largest.

"Waterflooding by commercial operators began on a pilot scale in one of the field's reservoirs, to determine whether the method would be effective in a highly permeable formation containing a thick, heavy oil.

"By obtaining rates of production decline, before and after the pilot waterflood went into operation, the Bureau determined that much more oil ultimately will be recovered in using this method. A drop in reservoir pressure was arrested, the report says, and the producing gas-oil ratio decreased. Both of these factors are recognized by petroleum engineers as indicating favorable conditions for increased oil recovery.

"The report was written by R. V. Higgins, Bureau of Mines petroleum engineer, San Francisco, Calif. It presents a detailed account of the waterflooding and also discusses corrosion problems encountered as a result of sea water being used for flooding. Several illustrations and tables supplement the text.

"A copy of Report of Investigations 5413, "Petroleum Engineering Study of Water Injection in Upper HX, Fault Block VB, Wilmington Field, California," can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number and title."

Encouraged to Learn the Joy of Discovery

To a youngster, the whole world—from sea to stratosphere—is his to explore. From his searching . . . studying . . . questioning, he occasionally grasps the meaning of what he sees. It is then—when he uncovers for himself a bit of the wonders of nature and science—that he experiences the joy that comes with discovery.

Today, educators in schools and universities believe, as we do, that it is important to encourage young people to pursue their interest in science. General Petroleum, in line with this belief, provides for school-age youngsters the film "In the Beginning," a geologic history of the earth . . . helps with the teenagers' Science Fairs and donates a total of 13 undergraduate and graduate scholarships in the fields of petroleum engineering, geology and geophysics.

These are just some of the many efforts that General Petroleum is making to benefit our younger citizens, and in the process help them to learn that the joy of discovery need not be restricted to childhood alone.

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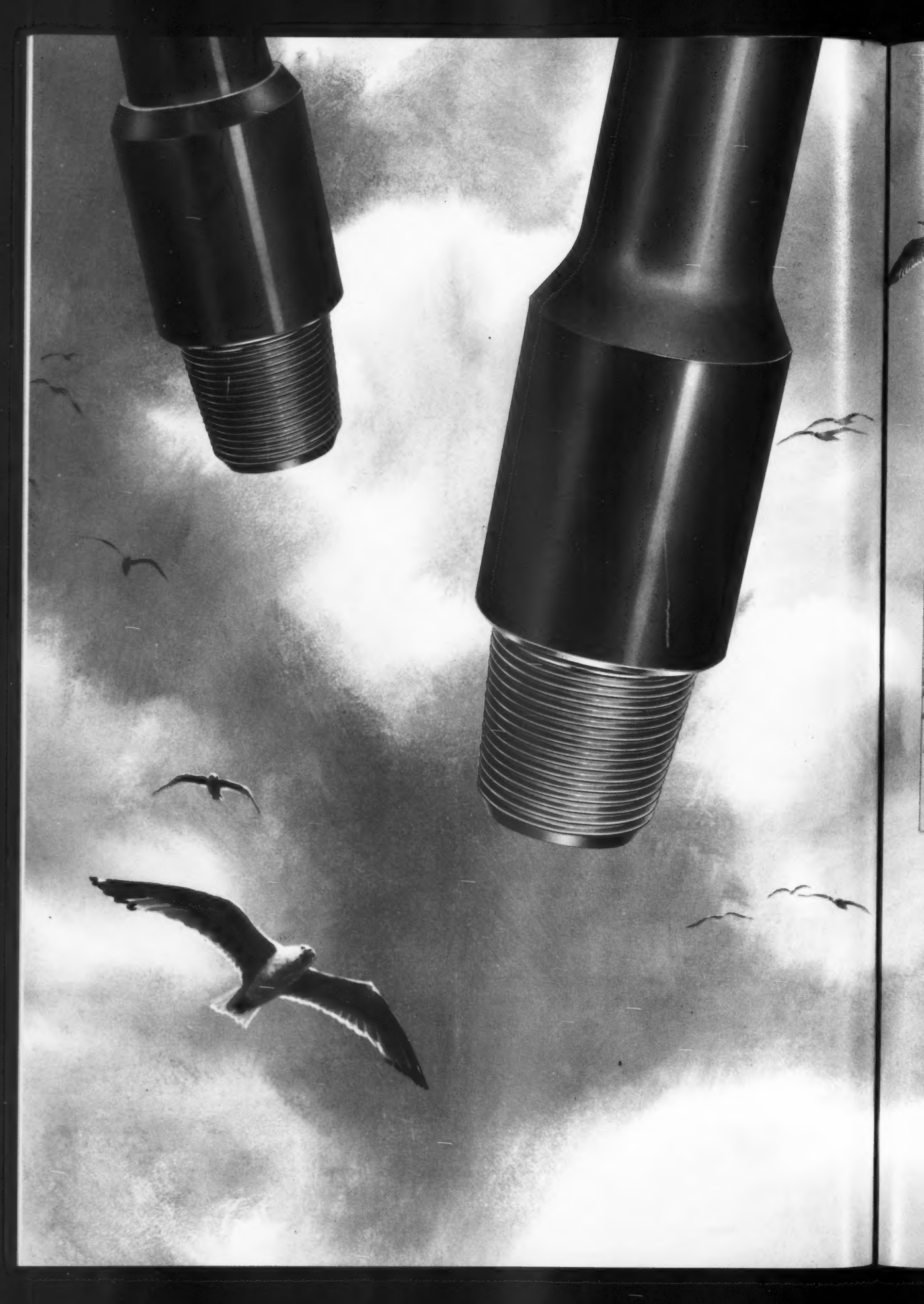

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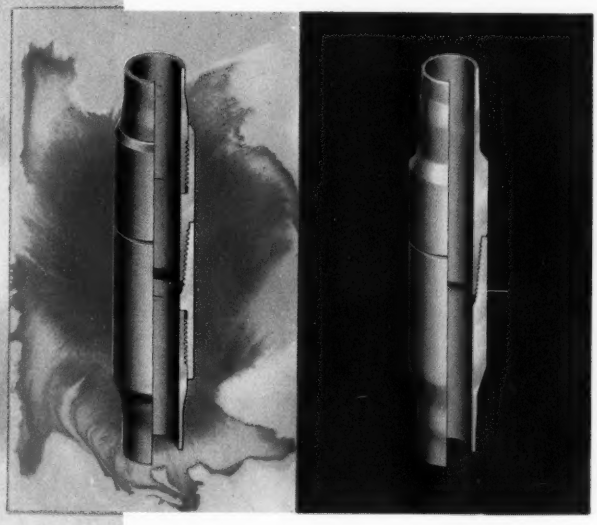

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PPP Annual Meeting

The Petroleum Production Pioneers Annual Meeting and presentation of Life Memberships will be held at Rodger Young Auditorium, 936 West Washington, on Saturday, December 6, 1958. This is the one at which you have an opportunity to let your hair down and scream at the officers for their misdemeanors during the past year, sez Dick Sneddon, the dapper secretary. Being first and foremost a business conventicle, this one is closed to guests.

The business session will begin as usual at 3 p.m. The cocktail period with Hugh Gribbin and his handsome band of ice manipulators in charge will be in full sway from 4 to 5:30 p.m., at which latter time dinner will be served. By 7:30 you can be on your way home if that's where you want to go.

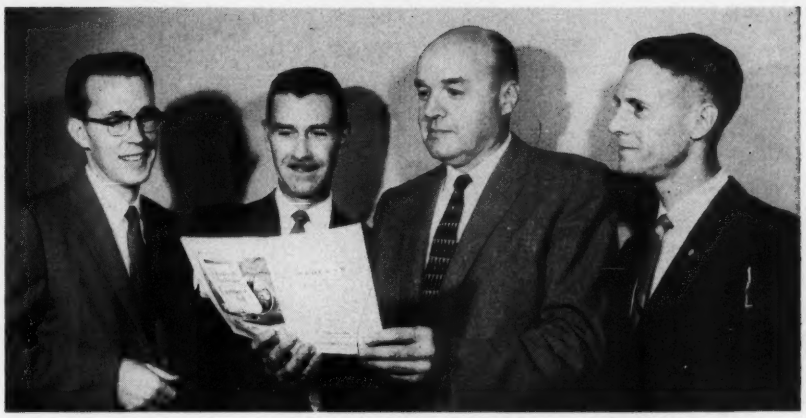
Wildcats — 'Nuff Sed

Over 1500 oil men are expected to attend the 34th annual Wildcat Hi-Jinks at the Hollywood Palladium on December 9, according to a statement by Stanwood I. Williams, chairman of the Wildcat Committee of the Western Oil and Gas Association. The doors will open at 5:30 p.m. for this traditional fellowship and fun frolic of the oil industry and its allied groups.

Ross McCollum and his Hot Shot Oil Band will be featured during the evening's festivities, highlighted by a series of "black-out" skits satirizing oil industry executives. A program of selected professional entertainment will follow.

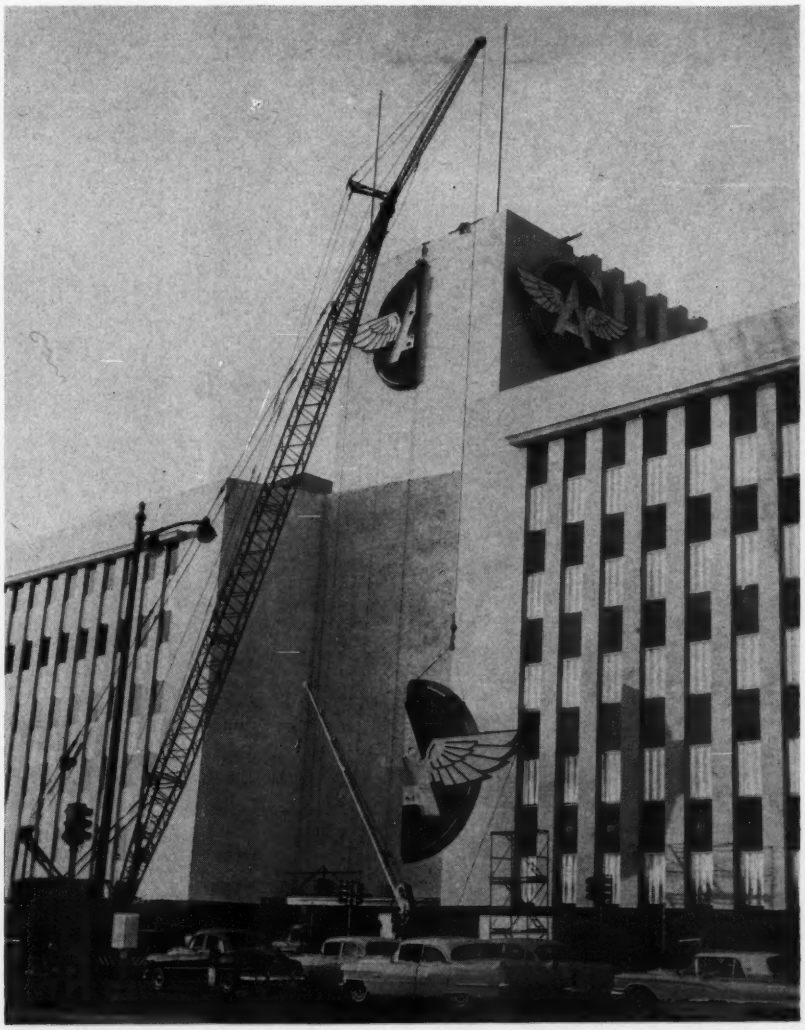
San Francisco Petroleum Subsection of A.I.M.E. Formed

Oil industry members of the San Francisco section of the American Institute of Mining, Metallurgical, and Petroleum Engineers have formed a Golden Gate Petroleum Subsection which has held its first bi-monthly luncheon meeting at the Bellevue Hotel, Thursday, November 20.



1959 OFFICERS OF PACIFIC SECTION—AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

Left to right—Paul H. Dudley, Jr., Secretary Humble Oil & Refining Company; John T. Isberg, President, Superior Oil Company; Irving T. Schwade, Vice President, Richfield Oil Corporation; Harold L. Fothergill, Treasurer, Union Oil Company.



Tidewater Oil Company's new home office building on Wilshire Blvd. at Crenshaw in Los Angeles nears completion with 180-foot crane raising the Flying A insignia to location. Tidewater is planning to be in its new quarters on December 1.

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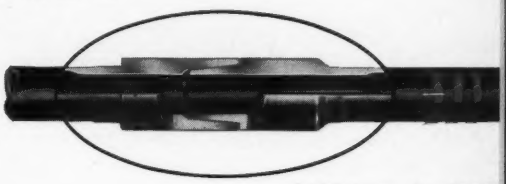
Weight*	Lb./Ft.	6.85	9.50	11.85	13.75	15.0
Wall Thickness	Inches	.217	.254	.262	.271	.296
Tension Data (Minimum Values)						
Load at Minimum Yield	Lbs.	135,900	194,270	230,760	270,030	328,070
Equivalent Length	Ft.	19,840	20,450	19,480	19,640	21,870
Collapse Data (Minimum Values)						
Collapse Pressure	PSI	8,380	8,080	7,080	6,290	6,140
Setting Depth (S.F. = 1½)	Ft.	14,900	14,370	12,590	11,180	10,920
Internal Pressure at Minimum Yield	PSI	9,980	9,600	8,660	7,900	7,830

*Tentative API Weights

YOUNGSTOWN LIGHTWEIGHT DRILL PIPE



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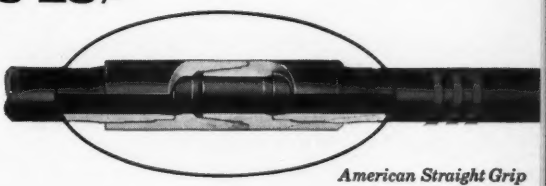

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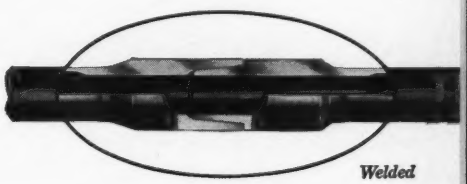

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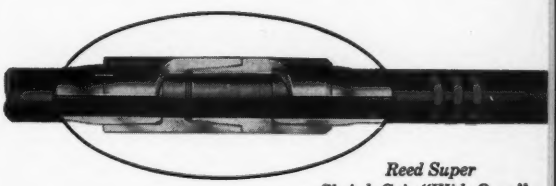

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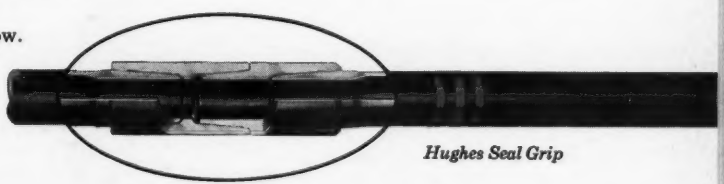
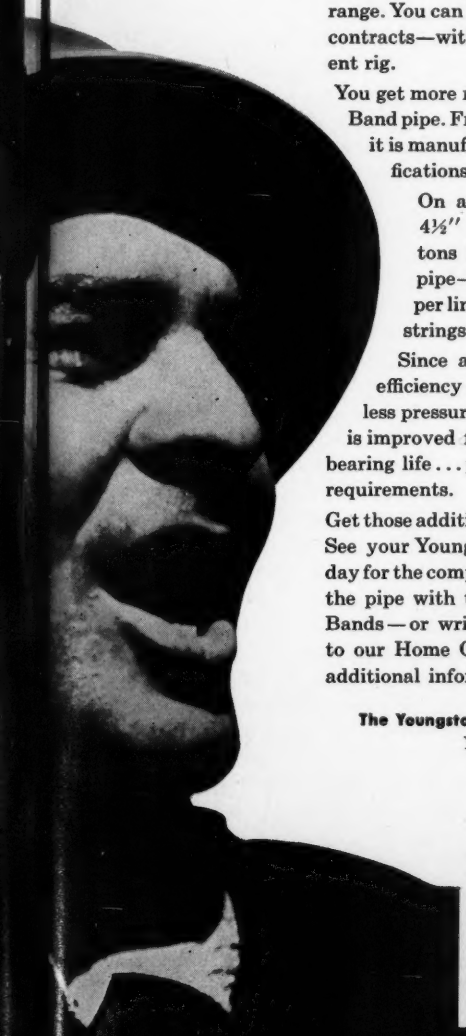


Hughes Seal Grip



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Petroleum LORE and LINGO

By RICHARD SNEDDON

Rocks Not Always Hard

If several costly and annoying operational mishaps are to be avoided when drilling to an underground oil zone through the layers that constitute the earth's crust, it is essential to exercise certain protective measures, regardless of whether cable or rotary tools are being used. To understand these fully, one must realize that rock to the geologist does not necessarily mean the solid heavy, hard substances for which we ordinary people reserve the term. As the bit makes its way downward, it may pass through strata of soft, heaving sands; friable sandstones; brittle, chalky limestones; shales that are fissile, as we learned earlier, and have a tendency to split into an astonishing variety of straight-line geometrical forms; and other odd materials such as bentonite and lime that effloresce when they come in contact with water.

The Efflorescent Ones

Effloresence is normally the result of a slow loss of water. It is characterized by the gradual deposition of flowerlike clusters of crystals dusted with powder. The phenomenon as exhibited by bentonite and lime is due on the contrary to the absorption of water. When either one of these substances is wetted, it swells, distorts, writhes like a living thing, and finally just falls apart. Some shales also have a peculiar habit of sloughing (pronounced "sluffing"), that is, peeling off surface layers and leaving them wherever they chance to fall. The verb "slough" is from an early German word that meant "the cast off skin of a serpent," and the peeling of shale has undoubted similarity. An interesting sidelight in this connection, although it has nothing to do with oil, is that a noted authority on the American Language, the late H. L. Mencken, was once asked to suggest a more dignified name for a strip-teaser. He offered "ecdysiast," a word he coined from the Greek *ekdysis* which is now used by zoologists to classify those insects, birds, and animals that periodically shed their outer skins. In view of the geologists' love for multisyllabic terms it is amazing that by this time they haven't chosen "ecdysiastic" scales in preference to sloughing ones.

Kinds of Breaking

And while we are discussing anomastics (that's "name calling" from Greek *onoma*, "a name"), please observe that "friable" is from the Latin *friabilis* which is part of the verb friare, "to break or crumble into small pieces!" "Brittleness" is a different kind of friability, generally associated with solids that break easily and with little or no deformation. That is to say, no change of shape, such as one might expect in an elastic substance like . . . well, like elastic!

Consequences of Sanding

Now all this crumbling, shattering, effloresing, and heaving of the subsurface formations in the side walls of the bore hole can bring about two conditions that are much abhorred by the driller. First, the loose material is most likely to drop into the well and clutter it up no end. It might even choke up the hole to such an extent that the bit becomes stuck and, in the case of rotary drilling, may finally cause a twist-off or break somewhere in the drilling string. Second, the stuff that falls into the hole leaves a vacancy behind that could conceivably reach sizable dimensions and be responsible for serious operational difficulties of which we shall learn more anon.

Profit and Loss

A twist-off, naturally, means a fishing job for the lost section, irrecoverable loss of time, and replacement or repair of any injured parts, all of which together is about the same thing as tossing a few thousand dollars into the middle of the Pacific Ocean. It may be difficult for some folk to believe, but in spite of prevalent opinion, an oil man dislikes losing money just as much as does any other business man. And the popular picturing of petroleum people as a race of financial giants who have inexhaustible hoards of gelt, which they alternately squander and recoup with easy abandon, is about as accurate as a slide rule with a knothole in it. The truth of the matter is that with few exceptions (certainly no more than you would find in other industries) oil men get no greater return from the sums they invest than do the local grocer or launderer. A particular oil company may be bigger than some other concern but this simply means that more people own it, and having learned a little about the cost of searching and drilling for oil, the reader will have no difficulty in subscribing to the idea that a big oil-operating concern needs plenty of owners.

Plastering and Casing

Returning to the main topic: As announced early in this meandering chapter, the driller takes two important steps to offset as far as possible the bad effects of disintegrating formations. During the drilling operation a suitable mud is introduced into the well. In the rotary system it is pumped down the inside of the hollow drilling string, out through ports in the bit, and back to the surface via the annular space between the outer circumference of the string and the wall of the hole. This mud plasters the walls and provides a preliminary protection against caving, heaving, sloughing, and similarly bothersome formational misbehaviors, and performs a number of additional useful functions besides. A second more lasting and more positive method of control is to line the walls with steel pipe or casing to reinforce them and, of course, exclude unwanted materials. This, too, has other essential purposes which will be disclosed at the appropriate time and place.

Well Shooting Begins

In the teething days of the young, squalling petroleum industry in Pennsylvania, oil wells were not cased but in field terminology were completed "barefoot." That is to say, they were

drilled to the objective depth, if any, bare of any supporting or sustaining element such as the casing just mentioned. In reality they were just holes in the ground. Caving sands were common in the productive areas and many wells were ruined when the bore holes choked up or as the operators would have said it—"sanded in." As an emetic for this congested condition, an ingenious chap named Roberts invented a torpedo which was merely a charge of nitro-glycerine, enclosed in a container. This was lowered to the requisite level by cable, and exploded. It blew the debris out of the hole, cracked new channels into the formation and, if the owner of the well was lucky, elicited a new and bigger yield of oil.

Disparaging the Ph.D.

This bit of historical stimulation had two outstanding results. It gave the old timers a priceless piece of fokelore with which to dampen the conceit of the "young squirts from the laboratory" who later began a mass encroachment of their sacred domain; and it developed a fabulous character, the "moonlighter," who wrote an exciting chapter into the petroleic legend. The first story is still told by graduates of the school of hard knocks to discredit the rapidly increasing army of young Ph.D's that is invading the dog house and the derrick floor and desecrating long cherished beliefs. It is a trifle gruesome in spots but it is a mighty effective bit of ammunition for a pioneer who is being harrassed by the infiltrations of science.

The Trouble Starts

It appears that a producer had one of his better wells sand in on him so he sent to the Roberts factory for a torpedo. The warehouseman placed the bomb carefully in the back of a horse drawn wagon. The driver climbed up in front, seating his dog beside him, and presently they were headed for the lease. But they never made it! Somewhere along the way, the wheel of the buggy dropped in a rut, the torpedo exploded and blew the entire equipage to pieces. The local folk gathered as much of the remains as they could find and were preparing for the burial when a near relative of the deceased objected strongly to his being buried along with the dog.

The Punch Line

The insurance company consequently hired a biological chemist at a very high fee to segregate the remains. In no time at all, the scientist arrived, loaded down with mircoscopes, balances, and all the paraphernalia of his abstruse calling, and without delay he began to work on his ghastly project. Three days and nights later he had it completed—the remains were separated into two pathetic heaps, a big one and a little one. And the principals were just about to hand him a check for his excellent services when the dog came home.

The Gory Details

The foregoing piece of fiction was obviously trumped up to furnish ribbing material for a deserving segment of the oil industry, but the true stories of the pioneers in the well shooting business is about as gory a sequence of events as you are ever likely to run across. For a considerable number of years men who either didn't care or were ignorant about the temperamental nature of nitro-glycerine, one after another blew themselves to pieces by careless or unskilled handling of the stuff. The "moonlighters" — operators who refused to pay license fees to the patentee—operated in the dark or did an equally thorough job of decimating themselves by moonlight. A few drops of nitro-glycerine, mistaken for a clear oil, was used to cool a heated journal. It exploded—killed the oiler, and blew the entire rig to pieces.

No Let Up

Experienced shooters were killed by jostling supposedly empty cans, magazines disintegrated causing untold damage to people and property, and the newspaper accounts of the rapid and awful succession of tragedies that took place between 1867 and 1890 are in lurid and intimate detail. The horror writers of today are sissies alongside the journalists of the nitro-glycerine boom days, and the word "boom" is not an accidental choice. Concluding this chapter, it should perhaps be noted that many careful, knowing men lived out their lives as well shooters without mishap. I personally took motion pictures and stills of a shooting job up in Santa Paula that was done by Ford Alexander and one of his crews. Ford has literally shot wells all his life and is still on the go at plus 70. Incidentally, in all likelihood, if I had learned the truth about well shooting before my photographic expedition to Santa Paula, it probably would have

GEARS FOR INDUSTRY
THE Lufkin LINE
OIL FIELD PUMPING UNITS

NOVEMBER IN CHICAGO

V. J. Fawcett

Up in room 521 at the Conrad Hilton, Lufkin people had the pleasure of hosting attending delegates to the 38th annual oil men's gathering in Chicago —November 9-14. Otherwise known as the American Petroleum Institute Convention. Attendance—6250. They came from everywhere.

The order of the day summoned good speakers, good people and good booze. Oh yes, and the weather was nice.

Nobody who heard George Romney, President, American Motors Corporation, will ever forget his challenging and provocative speech. Remarks like, "This was free speech at its best," followed his talk, where Mr. Romney laid bare some of the most ominous and menacing trends of our day, such as, "Too much concentration of power in large segments of American economy."

California oil men contributed generously to the success of this meeting, as always.

The Lufkin room was also the scene of free speech. Here, visitors, properly stimulated, relaxed and related their favorite stories.

These Petroleum Industry conventions are always a pleasure to attend. We are under strict orders not to mutter a word about the superiority or fine qualities of Lufkin Gears or Oil Field Pumping Units.

Lufkin FOUNDRY & MACHINE COMPANY

been necessary to take me up there in chains.

The Sweet Stuff

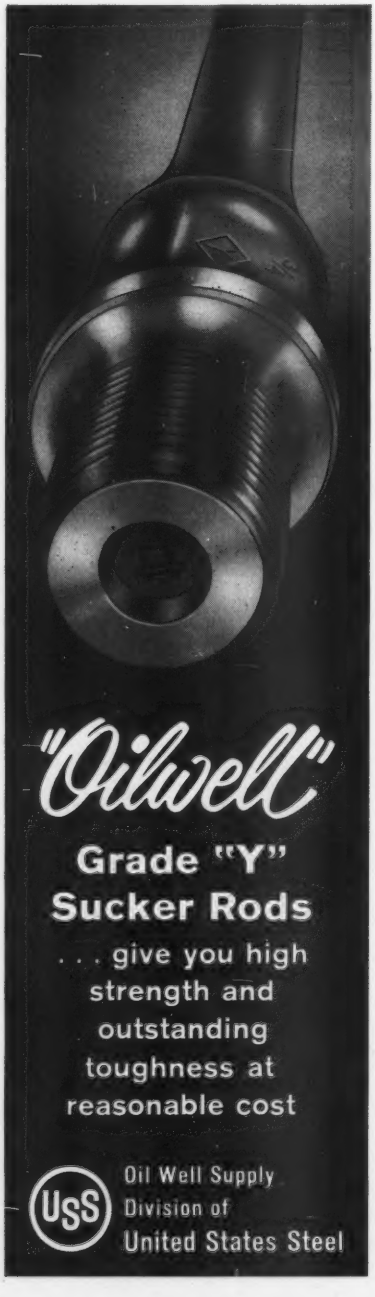
Glycerin gets its name from the Greek *glykeros,* "sweet" and is a species of alcohol that can be made from petroleum. Mostly, however, in the past it has come to us as a by-product of soap manufacture. It is sweet and syrupy and has been used for many years as a sort of unguent or ointment, which is the same thing, for soothing chapped or chafed skin. The chemically pure substance is known as glycerol and that-ol suffix indicates that it belongs to the alcohol family of compounds. And while it may be sweet and tractable in itself, when it is reacted with certain products of nitrogen, it yields nitroglycerine, and as we have learned, in inexperienced hands that can be a pretty obstreperous performer.

The Birth of Rotary

Continuing on the subject of drilling, it appears that rotary rigs were used for at least twenty years by water well drillers before they were given the official OK by the petroleum industry in 1901. That was the year in which the first rotary outfit actually employed to drill for oil, brought in the Spindletop discovery well in Texas and made the petroleum people sit up and take notice. One of the main differences between the older cable tool method and the newer rotary system, besides those already defined, was that in the latter the bit is attached directly to the bottom end of a hollow stem which in the beginning was held by clamps or gripping rings, and rotated by a suitable mechanism. As already explained, mud is pumped through this hollow stem and bit ports, and besides plastering the walls of the hole as previously intimated, it carries the cuttings to the surface, acts as a lubricant for the tools, and forms a heavy column of fluid to counteract the pressure from the formation should the well strike an oil and gas reservoir.

Evolution of Drill Pipe

It had probably been expected that the hollow stem (it is actually very heavy, strong steel pipe) besides giving added weight for quicker penetration, would also give sufficient rigidity to keep the bit traveling in a straight perpendicular path, but as we shall soon learn that was not so. The first stem consisted of comparatively light material, but as the objective depth of the wells increased, so also did the strength and weight of the drill pipe. Meantime, too, the gripping rings were abandoned and the "grief stem" or "kelly" was introduced for turning the drilling string. This was referred to in a preceding chapter. It consists of a square section inserted at an appropriate interval and it passes through a corresponding square with a protective bushing in the rotary table. The latter is like a large scale gramophone turntable and as it is rotated by the machinery, it rotates the kelly, and, of course, the entire drilling string of which the kelly is a part. As the bit makes hole, the kelly travels downward through the table and when it has reached a prescribed limit, it is disconnected and a stand of drill pipe is added to bring it back into top operating position. The reason for the name "grief stem" is fairly obvious. The words "rotary" and "rotate" are from the Latin *rota,* "a wheel" which is also self-explanatory.


"Oilwell"
Grade "Y"
Sucker Rods
. . . give you high strength and outstanding toughness at reasonable cost
USS
Oil Well Supply Division of United States Steel

The Power Plant

We have already discussed the derrick at some length. This enables the driller to raise and lower the tools in large increments and so reduces considerably the number of operations in the drilling process. It takes lots of power to handle these ponderous assemblies. This can be provided by boilers and steam engines, internal combustion engines, electric motors, and sometimes combinations of these. Immediately above the kelly is the swivel which supports the entire string and permits it to rotate on freely moving bearings. It also is equipped with a hose connection through which the mud passes down into the well while drilling proceeds. The kelly in turn is supported by the crown and traveling blocks, the drilling cable, and the derrick much as described in the cable tool system.

The Draw Works

The heart or pulse of the entire rotary rig is the draw works—a powerful winch or reel on which is spooled the strong steel cable that is used to raise and lower the drilling string. When one remembers that the string can be four miles long, it is easy to understand why this powerful machine should be equipped with several gear shifts so that it can be eased into its prodigious tasks. The draw works is usually employed also by means of a chain drive to turn the rotary table and has a couple of small pulleys, known as catheads which play an important part in "making up" or "breaking down" the various pipe and casing joints, that is, screwing them together or unscrewing them as the occasion demands. The cathead probably takes its name from a similar device used for centuries by mariners to facilitate hoisting the anchor but how the word originated I do not know at the minute.

The Mud Hogs

Other important items in the make up of the rotary rig are the mud pumps or "mud hogs" as they are usually termed, partly because they have a

tendency to emit a peculiar grunting noise when they are at work, and partly because like their namesakes they are continually wallowing in mud. The pumps circulate the fluid to the bottom and return and when it reaches the surface and overflows the well bore, it passes over a shale shaker where cuttings are sifted out, thence to a settling pit, and finally to the suction pit where it is again picked up by the pump and sent on another round.

The Rotary Crew

It is really entertaining and enlightening to watch a rotary crew at work. The driller is the top hand and his boys give about as fine an exhibition of cooperative manipulation as you are ever likely to see. From the preparation of the mud to the final completion of the well, it seems as if there is never an idle minute. Even when the drill is churning its way towards what they hope will be pay dirt and it would seem as if there could be little to do, they busy themselves with incidental tasks on the derrick floor and around the rig. Good housekeeping on a drilling rig is now pretty thoroughly recognized as safety insurance. In addition to that, if the location of the job is anywhere near a city or even a village, there is the all important necessity of making a good impression on the town's people. Public relations is not just the responsibility of the head office in these modern times. Every man in a company's employ is an integral and important member of the organization, and as such his personal behavior on the job as well as his caretaking of the property on which he is working are important in the overall institutional anxiety to win the regard of John Q Public and his wife and family.

Mud Engineering

It is impossible for one person to be conversant with all the ramifications of petroleum research, because the industry has fanned its efforts out from many focal centers and so in the course of time dozens of what were once just incidental operations have blossomed into separate important organizations or occupations. It is not surprising then that from a practically accidental start, mud engineering has become a quite indispensable adjunct of rotary drilling. Since the earliest days of the industry when water was introduced into the borehole for the primary purposes of cooling the bit and carrying the cuttings to the surface, a great deal has been learned about drilling fluids and their function. Books have been written on the subject and today there are actually available college courses on the chemistry and engineering of rotary drilling muds.

Discussion of Qualities

Mud was probably first used in the Spindletop discovery well and there is little doubt that at that time mud pits were chosen with no regard to their constitution, chemical or physical, excepting perhaps that even then there was some suspicion that fineness of the suspended particles, weight or density of the product, and ability to keep the solids in suspension, were critical factors. These are still important properties but they are far from the only determinants of mud quality in the present state of our thinking. Perhaps, however, before we get too far along with this particular study we should understand a few of the involved fundamentals.

W. W. Cline

Nineteeners Elect Officers

Officers and directors of Nineteeners just elected for the 1958-59 season are as follows: Big Shot—W. W. Cline, Sun Drilling Company; Hot Shot—John Robinson, Macco Corporation; Hook Shot—Lev Sacre, Wireco; Half Shot—Sam Patterson, Bankline Oil Company; Director at large—Henry Paulsen, immediate past Big Shot. Committee chairmen are as follows: Membership—Joe Aderhold, gentleman of leisure; Tournament—Fox Boswell of the Boswell Enterprises; Handicap—George Trembley, gin rummy instructor; Public Relations — Charlie Perkins, Union Oil Company purchasing chief; Entertainment—Wm. Conroy, National Aluminate Corporation and Prize & Trophy —Rand Hogan, Kaiser Steel Company.

Solutions and Emulsions

When solids and liquids are brought together and shaken thoroughly, several things can happen. The solid can dissolve completely in which case we have a solution; the solids if they are fine enough and have certain properties can remain in almost permanent suspension and we have what is known as a colloid; or the solid can settle out very quickly after the shaking in which case we merely have a mixture of two substances, one liquid and one solid. Sometimes it is possible by means of a third component to hold the solid material in suspension much longer, or conversely reduce the tendency of the solids to remain in suspension. By the same token it is possible to make two normally immiscible liquids blend almost completely and stay that way for a long time in the form of what the chemist calls an emulsion. In a solution, the substance that is dissolved is the solute and the one that does the dissolving is the solvent, and the difference between a solute, a colloid, and the solid in a mixture, is largely a matter of the size of the particles.

Some Origins

The derivation of some of these words will help to a better understanding of the subsequent discussion. "Colloid," for instance, is from the Greek *kolla,* "glue," which gives some impression of its special property. Colloids have a sort of gelatinous quality and were so named by a noted physicist, Thomas Graham, to distinguish them from crystalloids which completely lack the jelly like adhesiveness of the former. "Gel" is from the Latin *gelata,* "jelly." Suspension is also from a Latin word *pendere,* "to hang," which expresses the phenomenon very nicely. "Emulsion" is from the Latin *mulgere,* "to milk" and emulsions do have a decidedly milky appearance. They are the result of the presence of a third substance, usually of a resinous nature, that forms tiny envelopes around finely dispersed globules of one of the liquids and keeps them from coalescing or coming together, so that they stay suspended in the other. In an oil emulsion, for example, it is possible to have an emulsion of oil in water or the reverse phase which is an emulsion of water in oil.

BUTAMER*

The most practical method for producing alkylate: Butamer and HF Alkylation in combination as a single unit

Increasing use of alkylate for blending into motor fuels makes these two up-to-the-minute processes highly important to petroleum refiners. Butamer is a new process for producing isobutane . . . "HF" Alkylation is an efficient, economical process which combines isobutane with olefins to produce alkylate, much in demand today as a motor fuel component.

With the advent of high compression ratio engines, usually starting at 9.5:1, motor fuel, especially those deficient in isoparaffins, have been associated with an unusual engine noise called "rumble." Further study reveals this rumble can be eliminated through the use of a better balanced fuel, namely using a fuel composed of a greater volume percentage of isoparaffins. Alkylation produces a high octane isoparaffin that also has good sensitivity, ignition point and combustion characteristics.

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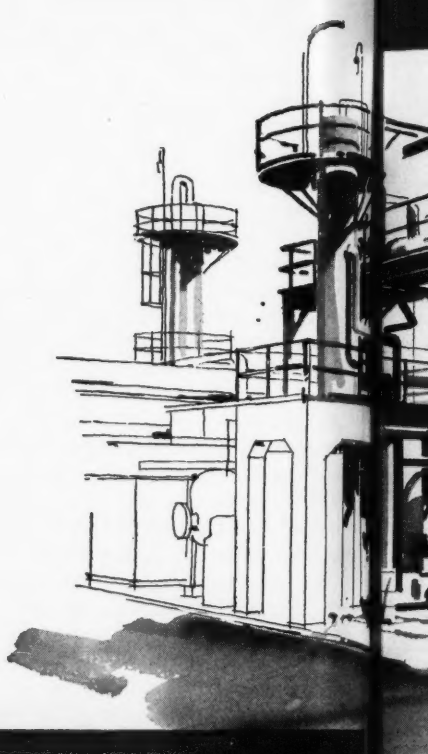

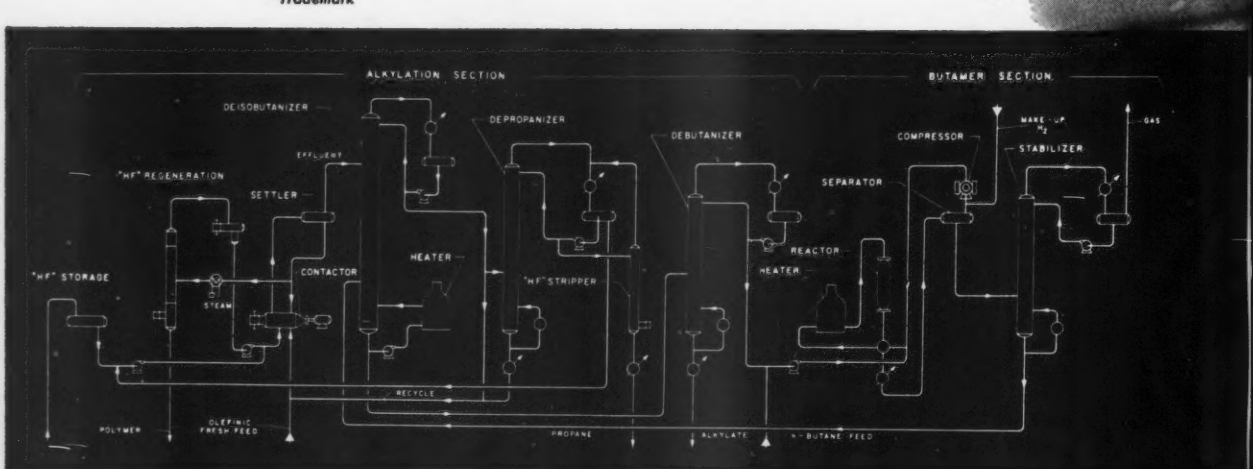

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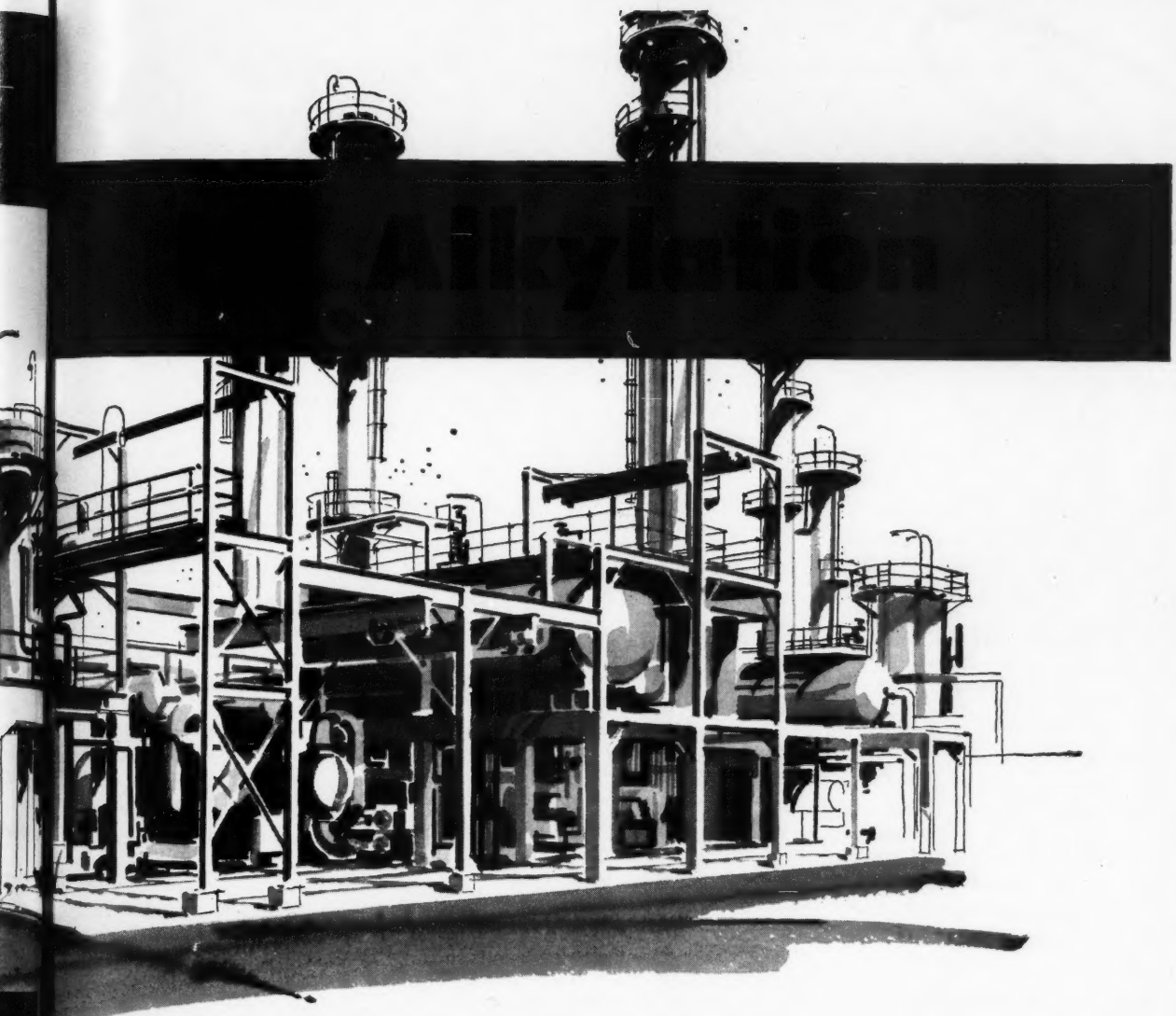

Butamer—Heart of this process is a noncorrosive, stable and rugged platinum-containing catalyst especially developed by UOP. Capable of operating at relatively low temperatures, its use assures a sufficiently high concentration of isobutane in the reactor effluent to eliminate excessive recycle of normal butane.

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Personalities IN THE NEWS

Mutual congratulations between A. W. Rose (left) and E. S. Dulin

BJ Elects Top Brass

E. S. Dulin, president of Byron Jackson since 1929, has been elected Chairman of the Board and **Andrew W. Rose** named to succeed him as president and chief executive officer of this division of Borg-Warner.

Under Dulin's almost 30 years of leadership, Byron Jackson became one of the West's leading industrial organizations. He added to its basic pump and oil tool manufacturing such diversified new operations as electronics, nuclear equipment, oil well services and industrial rubber products. The company became a division of Borg-Warner in September, 1955.

Andrew Rose, who became the fourth president of this 86-year-old, California-founded firm, has been vice president and assistant to the president since September, 1957. Mr. Rose has been associated with Byron Jackson since 1955. He had previously held numerous important responsibilities in the Borg-Warner group since 1931, including vice president and general manager of the Petro-Mechanics Research Division; vice president of Warner Gear Division; and assistant to the chairman of Borg-Warner Limited.

Continental-Emsco Makes Promotions

H. E. Lowrey has been promoted to the position of Vice President, Export Division, for Continental-Emsco Company. The announcement was made by **F. M. Mayer,** President of Continental-Emsco.

Mr. Mayer also announced the expansion and removal of the New York Export offices to new and larger quarters at 30 Rockefeller Plaza. The New York office serves as administrative and sales headquarters for the entire Export operation.

In his new position Lowrey will have operating supervision of Continental-Emsco's Export Division. This includes the Houston and London export offices, and three stores and two offices in Venezuela. The Houston office was established three years ago in order to serve export operators located in the Southwest more efficiently and to speed service to Continental-Emsco's Venezuelan stores and offices. The London office holds the responsibility for Export's operations in Europe, Africa, and the Near East. The distribution of Continental-Emsco oil field equipment through agents and representatives is also under the direction of Lowrey. Continental-Emsco Export also works with foreign licensees in France and Italy.

Lowrey previously held the title of Manager of Export Division and has directed the operations of Continental-Emsco's far flung export business for the past three years. He joined the company in 1935. He is a graduate of Louisiana Polytechnic.

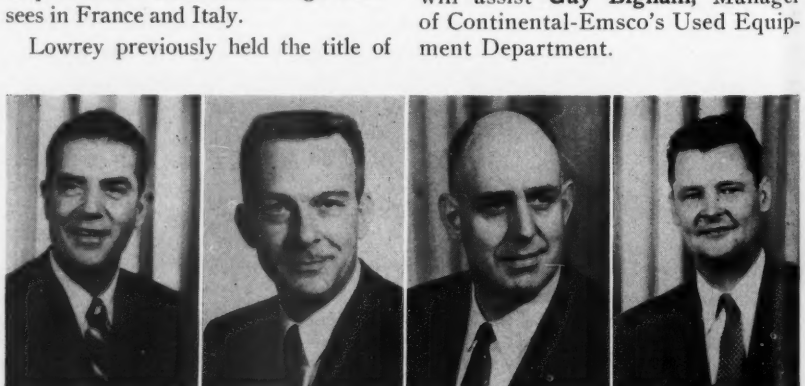
Also announced was the appointment of **Charles Spitzfaden, Jr.,** as manager-Drilling Equipment Sales. He will headquarter in the Dallas home office of the oil field supply and manufacturing company.

Spitzfaden, former Drilling Equipment Sales Engineer, joined Continental-Emsco in 1937 after receiving a Mechanical Engineering degree from Washington University.

Another announcement was the appointment of **J. Allen Whitesides** to the position of Sales and Development Engineer-Drilling Equipment.

Whitesides, in a newly created post, will work closely with Continental-Emsco's distribution, engineering and manufacturing personnel on new equipment development and research. He will also be available for technical assistance on the application of present and experimental drilling equipment manufactured by Continental-Emsco.

The company further announced the appointment of **Dean P. Davis** as Used Equipment Representative. Headquartering in Dallas, Davis will assist **Guy Bigham,** Manager of Continental-Emsco's Used Equipment Department.



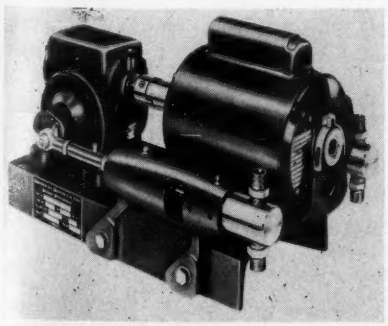
H. E. Lowrey | Chas. Spitzfaden, Jr. | J. A. Whitesides | D. P. Davis

New Proportioning Pump

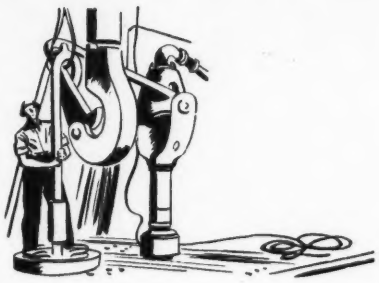
Series 100 controlled capacity pumps, just introduced by American Meter Company's Pump Division, have been developed to handle many applications in such industries as petrochemicals, chemicals and water treatment, particularly in power production. In announcing the pump, Robert J. Browne, Division General Manager, described Series 100 pumps as "rugged, dependable, controlled capacity pumps for moving specific volumes of fluids wherever low initial low initial cost, design simplicity, accuracy of control and minimum maintenance cost are prime requisites."

Series 100 Simplex models handle capacities ranging from 0.65 gallon per hour to a maximum of 13.10 gallons at a maximum pressure of 1000 psi. Duplex Series 100 models are rated at double the capacities of the Simplex models. Capacity regulation is easy and accurate. A screw adjustment on the crank adjusts the stroke while the pump is stopped. Stroke length is adjustable from 0 to a maximum of 1½ inches. Repetitive metering accuracy within a tolerance of (plus or minus) 1% is obtained when the pump operates between the limits of 10% to 100% of stroke length.

Spherical self-aligning bearings on both the crank and plunger ends of the connecting rod ensure longer service life by taking greater radial and axial thrust loads than more common types



American Meter Proportioning Pump.



of bearings. Nylon dust covers assure the long life of the heavy duty spherical, lubricated, self-aligning bearings by preventing dirt and dust from entering the bearing surface and mixing with the bearing lubricant. The steel crosshead in Series 100 pumps is heat-treated, hardened to 55 Rockwell C and ground to accurate dimensions.

Minimum restriction in flow is provided by ball-check column type valves with replaceable seats. These valves allow for the minimum requirement in net positive suction head. "E-Z" clean valves are available as optional equipment, for use with Series 100 pumps. With the latter type valves, piping need not be broken in the event that valves require cleaning or replacing.

All Series 100 pumps are driven by standard NEMA frame fractional horsepower motors. Electric motor is open, drip proof, single phase, 60 cycle, 115 volt. Motors with different characteristics can be supplied at extra cost.

Liquid ends are machined from carbon steel, and types 303, 316 and Carpenter 20 stainless steel. For handling more corrosive fluids, liquid ends machined from Hastalloy B, C and D are available. A simple screwed gland nut in Series 100 pumps provided positive adjustment for the packing.

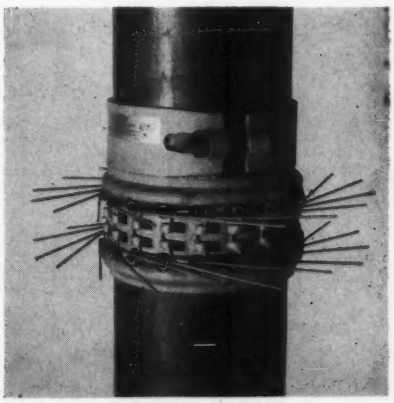
Cathodic Protection System

Corrosion Rectifying Company has completed a rectifier type cathodic protection system for the H. K. Porter plant in Pascagoula, Mississippi, it was announced by Wayne A. Johnson, President. The rectifier system is designed to prevent land and water side corrosion of the underground piping, tanks and piling.

The project is being handled by Corrosion Rectifying Company's Southeastern Division office in New Orleans, Louisiana, under the management of Mr. James T. Condry.

Combination Scratcher Design

B and W, Inc., specialists in Primary Cementing Tools, has developed a combination Friction Lock Clamp-Solid Nu-Coil Scratcher, a new fixed device for removing mud cake from well walls and assuring proper circulation during cementing operations. This combination unit is slipped over the casing to a selected position and the Friction Lock Clamp is tightened with a power impact or hex set wrench. Being a fixed scratcher, rather than a floating or free-moving unit on the pipe, this new unit provides 100 percent effectiveness in removing filter cake from the formation. Every foot that the pipe moves during reciprocation moves the unit one foot. Numerous tests have proved that there is no more deformation of fixed scratchers on removal than with the floating type. It also eliminates welding on casing for holding purposes, which in many cases is injurious to the casing.



B and W Scratcher

Field Development

Pacific Coast and "4" Corners

LOS ANGELES BASIN

Hillcrest Country Club Completion

Signal Oil and Gas Company's Signal-Richfield-Hillcrest No. 1 on the Hillcrest Country Club in Section 25-1s-15w, was completed flowing 750 b/d of 33 gravity clean oil from a perforated interval of 682 feet just above 9500 feet. Total depth of the well is 10,219 feet with 7" casing cemented on bottom. Signal Oil & Gas Co.'s Signal - Richfield - Community No. 1, which has been suspended since August, has resumed operations and is gun perforating for production testing. Depth of the test is 8816 feet with 5½" casing cemented at 7853 feet.

Orange County Completion

In the Olive area, Atlantic Oil Company placed Dowling No. 4 on the pump good for 125 b/d of 15 gravity oil, cutting less than 1 per cent. Located on Section 7-4n-9w, the well was drilled to 5095 feet and has 7" casing cemented at 4680 feet.

Wilmington Out-Post Completes

E. C Simmons completed C.N.C.-5 No. 1 on Section 35-4s-13w pumping 20 b/d of 12 gravity oil, cutting 7 per cent. Located near the intersection of Harbor Ave. and 15th Street, the well, an extension test, is bottomed at 3781 feet and has 7" casing cemented at 3612 feet.

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- Pipe Threading, Testing, Straightening, Cleaning, Inspection
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- Vertical Mill Cut Slotting
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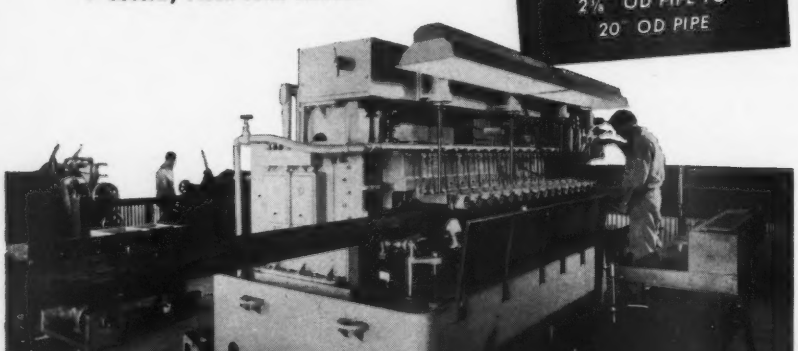

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Beverly Hills Area

Hudson Gas & Oil Company is drilling below 3900 feet on Los Angeles Country Club No. 3, its third try on Section 23-1s-15w. Well No. 1 is standing suspended at 9367 feet, while Well No. 2 is also suspended at a depth of 8121 feet.

Olinda Field Deep Test

Shell Oil Company is planning to drill Olinda Fee Four No. 47-14, a deep test of the field. Location for the test falls 783 feet north and 2728 feet west from the southeast corner of Section 14-3s-9w.

Potrero Wildcat For Standard

Standard Oil Company is moving in rotary to drill Hardy Community No. 2 in Section 34-2s-14w. The test is a southerly offset to Standard's Hardy No. 1 which was completed in August at a depth of 10500 feet. Details of the completion were not released.

West Newport Well Abandons

Monterey Oil Company abandoned its Newport Beach No. 17 on Section 29-6s-10w at a redrilled depth of 6556 feet. Total depth of the well was 6683, but it was plugged back to 3957 feet and redrilled from 3935 feet.

New Richfield

Island View Oil Company has staked location for Kurt No. 1 near the intersection of Mariposa and Lakeview Avenues on Section 33-3s-9w. Don Smith is the Engineer.

SAN JOAQUIN VALLEY

Gosford Field Completion

After deepening from 8150 feet to 10,307 feet, Hancock Oil Company recompleted its KCL No. 74-23 on Section 23-30s-26e flowing 234 b/d of 31

gravity clean oil through a 19/64" bean with 225 psi flow pressure. Gas flow was 111 MCF. The well is producing from two perforated intervals—10,160-10,283 feet and 9412-9519 feet.

Madera County Well Abandons

Two miles southeast of the Moffat Ranch Gas Field, Union Oil Company has abandoned Union - Texas - U. S. Royalty No. 77-17 at a total depth of 6716 feet. Located in Section 17-12s-15e, the test was low structurally, coring the top of the Panoche at 5732 feet.

Chowchilla Gas Test

Chowchilla Gas Company is ready to spud Southern Realty No. 3-6, a gas test in the southeast-quarter of Section 6-10s-14e. The test is expected to go to approximately 8000 feet.

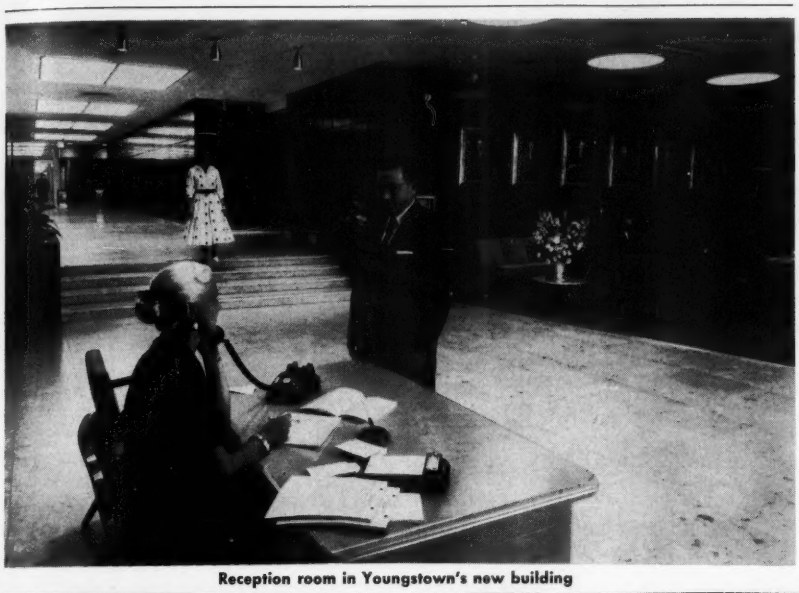
Paloma Extension Test

Hamilton Dome Oil Company, Ltd. is drilling below 7000 feet on its KCL-A No. 25-20 in Section 20-31s-26e. The 11,600 foot test, located in the southwest quarter of Section 20, is approximately one-half mile north of the present Paloma Field production.

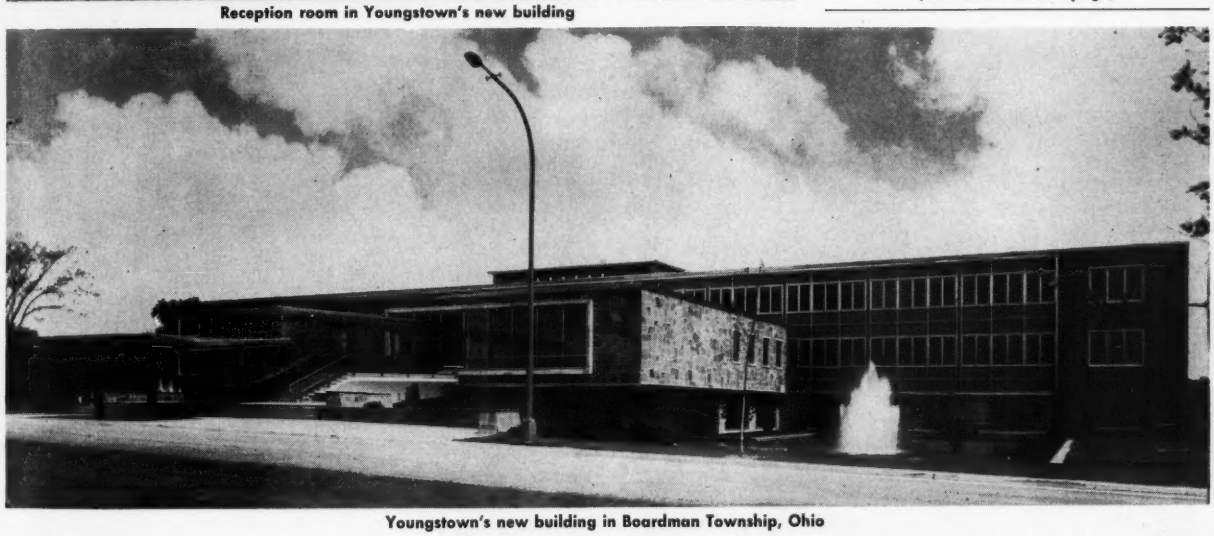
Tejon Completion For Reserve

In the "Main Area" of the North Tejon field, Reserve Oil & Gas Com-

(Continued on next page)



Reception room in Youngstown's new building



Youngstown's new building in Boardman Township, Ohio

New Facilities For Youngstown

Marking a significant step in its impressive 58 year history, The Youngstown Sheet & Tube Company has moved into its new general headquarters on Market Street in Boardman Township, Ohio. The new building is a thoroughly modern structure, designed to provide the best possible working conditions for some 425 employees and is so arranged departmentally as to facilitate the firm's diverse administrative activities, not only in the headquarters area but wherever Youngstown products are marketed. Also an important factor in the total layout was the blending of the building, landscaping, and immediate surroundings into an attractive entity of which the Boardman residents as well as Youngstown employees should be proud.

In announcing the occupation of the new quarters, Mr. J. L. Mauthe, chairman of the Board of Directors, said, "I look upon our new building as a symbol of the strength of our company and as concrete evidence of our confidence in the future." He also remarked that while the various units were designed with that degree of departmental correlation essential to the most efficient operation, "the attainment of excellent working conditions and employee comfort was also a prime consideration."

On the Pacific Coast, Youngstown Sheet & Tube Company, under the able direction of J. A. Crawford and R. I. Whelan, has for many years enjoyed the generous patronage and high respect of the petroleum and related industries, and we congratulate these gentlemen as well as the headquarters staff on this very tangible demonstration of belief in the principles of free enterprise and faith in the basic soundness of the American industrial system.

pany has completed its most easterly well, BW-SP No. 338-17, flowing 798 b/d of 32 gravity oil, cutting 3 per cent. Flow was through a 16/64" bean with 1700 psi flow pressure and 983 MCF of gas. Total depth is 12,216 feet with 7" casing cemented at 11,631 feet. Open to production in the 5" liner is the perforated interval 11,636-11,827 feet and 11,867-12,172 feet.

Buena Vista Area

Honolulu Oil Corporation's Calidon No. 10 on Section 19-31s-23e is coring ahead below 5650 feet after a successful test of the interval 5505-5605 feet. On the test the well flowed at a 1100 b/d rate of 28 gravity oil, cutting 1 per cent. Previously on a test of the interval 3867-3945 feet, the well flowed in excess of six million cubic feet of gas per day through a ½" bean. Honolulu Oil has spudded in its Calidon No. 11 approximately one-quarter of a mile to the south of well No. 10, for a 5600-foot Stevens Sand test.

Richfield Oil Corp. is grading location for United-R No. 522, a northeasterly extension test of the "555" Stevens Pool, located in the center of the northwest quarter of Section 20-31s-23e.

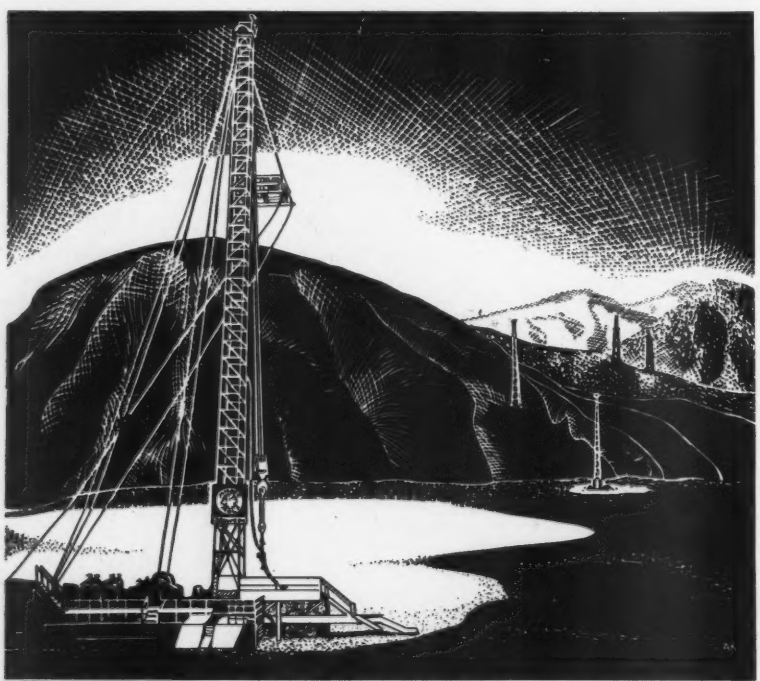
Vallecitos Area Activity

In the Cedar Flats area, Franco Western Oil Company has abandoned Ashurst No. 88X-27 on Section 27-16s-11e. Total depth was 2001 feet.

Coast Exploration Company is drilling below 2100 feet on its Bryant-USL No. 16B-28. The test is located in the southwest quarter of Section 28-16s-11e.

Strand Completion For Universal

Universal Consolidated Oil Company's Statex-KCL No. 28-8, easterly extension test of the field in Section 8-30s-26e, has been completed flowing 224 b/d of 28.5 gravity oil, cutting 1.7 per cent. The well reached a total depth of 10,082 feet and has 7" casing cemented at 8403 feet. Flow is from the 20-foot perforated interval 8290-8310 feet. An interval from 8235-8135 feet will be tested at a later date.



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COASTAL AREA

Standard Gets Offshore Discovery

An oil discovery of important proportions, first accomplished under the State's new program for exploring and developing certain of the untested offshore lands along the Southern California coast, was announced today by H. G. Vesper, president of Standard Oil Company of California, Western Operations, Inc., as operator.

Vesper said the company's exploratory well, Standard - Humble State Lease P.R.C. 1824.1 at Summerland, flowed oil of 36° API gravity at an estimated rate of 865 b/d during a brief test. Further tests are continuing to determine the importance of the find, he said.

The well, 9 miles southeast of Santa Barbara and 2.2 miles from shore, was drilled from a stationary platform built at a cost of more than three million dollars. It is located on a 5500-acre lease awarded jointly to Standard and Humble Oil & Refining Company in January of 1957 for a bonus bid of $7.25 million.

Rincon Island Completion

Richfield Oil Corp. has completed and shut in the first test drilled on the man made island located 3000 feet offshore from Rincon. The test was drilled to 2648 feet and plugged to 2523 feet. The 8⅝" casing is cemented at 2422 feet. Richfield's second test, State 1466 No. 44-13 has been drilled to a total depth of 3375 feet and is testing.

Reasoner Canyon Test Abandons

E. B. Hall & Company and Wayne Loel have abandoned their Well No. 1 on Section 20-5n-18w at a total depth of 2011 feet. The test was located two and one-half miles north of the Temescal Field.

Elwood Gas Discovery

Two miles northeast of the Elwood Field, Standard Oil Co. of California completed Roy Eaton No. 1 on Section 11-4n-29w flowing 2226 MCF of gas per day through a 74/64" bean with pressures of 282/400 psi. The test was production tested last July and shut in. Drilled to 3596 feet and plugged to

3450 feet, 7" casing is cemented at approximately 3400 feet.

Los Olivos Wildcat

Three miles southeast of the Zaca Field, Honolulu Oil Corporation is ready to spud Joughin-Dabney No. 1 located in the northwest quarter of Section 19-7n-30w.

Gaviota Offshore Test

Standard Oil Co.'s Standard-Humble-Gaviota State No. 1, located three quarters of a mile offshore from Gaviota, drilled and cored to 7748 feet and is running a series of tests as drilling progresses.

Harmon Canyon Abandonment

Shell Oil Company has abandoned Hearne-Walker No. 2 in Section 33-3n-22w after drilling to 6598 feet. The test was located approximately four miles west of the southerly end of the Saticoy Field.

Phillips and Pauley Spud Test

Phillips Petroleum Company-Pauley Petroleum Inc., et al have spudded a stratigraphic exploratory test well approximately three miles west of the Elwood oil field and 9000 feet offshore. This new operation is on a 3840 acre lease awarded by the State of California on July 25th of this year. The exploratory well is being drilled by Western Offshore Drilling & Exploration Company, as contractor, from a floating barge, the "Venmac III."

NORTHERN CALIFORNIA

Gas Test Abandons

In the Willows area, Glenn County, Ferguson & Bosworth have abandoned their Kalpure-Montague-Baker No. 1 well near Willows. Located in Section 4-20n-2w, two miles north of productive limits of the Beehive Bend Gas Field, the test was drilled and cored to 5983 feet.

Solano County Test

Arcady Oil Company is drilling below 3800 feet on its Liberty Farms No. 5-1 in Section 1-5n-2e in the Maine Prairie area. The test will be drilled to approximately 6000 feet and is about one-half mile northeast from production.

Beehive Bend Completion

Sherman F. Wagenseller and John J. August were successful on their first try in the area with the completion of Section 70 Unit No. 1 on Section 11-19n-2w. On a test of the perforated in-

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106

terval 5950-5970, 5934-5945 feet and 5920-5925 feet, the well flowed 7300 MCF of gas per day thru a ¾" bean with pressures of 500/1700 psi. Total depth of the well is 6244 feet and it is located on a 320-acre farmout from the General Petroleum Corporation.

Vernalis Gas Completion

Porter Sesnon et al has completed Sesnon-Giambastiani No. 33-22 flowing 11,300 MCF of gas per day thru a ⅜" bean. An extension test located on Section 22-3s-6e, the well is bottomed at 4144 feet and has 5½" casing cemented at 4144 feet. The well, a new pool discovery, is located on a block of approximately 30,000 acres with Great Basins Petroleum Company having a one-half interest in the project. In the same general area, Porter Sesnon et al is preparing to complete their Sesnon-Vernalis Unit 3 No. 64-15 on Section 15-3s-6e. Drilled to a total depth of 4206 feet, 5½" casing is cemented on bottom.

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Western Gulf Abandonment

Western Gulf Oil Company has abandoned Rita Behring No. 1 in Section 13-17n-1w at a depth of 4034 feet. An electric log was run and the well tested before being abandoned.

Colusa County Gas Test

Franco Western Oil Company is drilling below 1000 feet on Andriotti No. 1-20 on Section 20-14n-1e. This is the company's second test in the area and will be drilled to 4000 feet. The first test, Morton No. 1, located 1000 feet to the north, was abandoned at a depth of 4200 feet.

Butte County Abandonment

Kohlbush and Campbell have abandoned Western Gulf-Persons No. 1 at a depth of 4532 feet. The test was located in Section 2-18n-1e, one and one half miles north of the Schohr Ranch gas production.

Yolo County Test Quits

Arcady Oil Company has abandoned its Bert Noble No. 1-4 on Section 4-8n-1e at a total depth of 4880 feet. The test was located approximately two and three-quarter miles northeast of the Winters Gas Field.

Princeton Well Abandons

Humble Oil & Refining Company's Bounde Creek Gas Unit Two No. 1 on Section 24-18n-2w in Colusa County, three-quarters of a mile north of production, drilled to 3044 feet and has been abandoned. The 4½" casing was cemented at 3019 feet.

OTHER STATES

Alaska

Standard Oil Company of California and Richfield Oil Corp's Swanson Unit No. 3 in Section 23-8n-9w is trying to recover stuck drill pipe. Depth of the test is 11,653 feet.

Oregon

Linn County Development Co. is drilling ahead below 2710 feet on its Barr No. 1, a 5000-foot test, located fourteen miles southeast of the town of Albany in Section 32-11s-1w in Linn County.

Washington

Standard Oil Company's Widbey Island test, Engstrom Community No. 1 in Section 17-30n-2e, is drilling below 4500 feet. The test is located 25 miles northwest of the town of Everett in Island County.

Arizona

Western Oil & Minerals, Inc. will drill Walters No. 3, a 5500-foot Granite Test in Section 24-19n-10e, approximately 25 miles southeast of Flagstaff in Coconino County.

FOUR CORNERS AREA

Phillips Petroleum Company has staked location for Navajo No. 9, a Paradox test in wildcat territory. The test is located in the center of the northeast quarter of the southwest quarter of Section 16-41s-24e, approximately two miles north of White Mesa.

The Texas Company's Aneth Sand test, Navajo-Q No. 6 in Section 35-40s-24e, spudded the first part of November, drilled to 1515 feet and is testing shut-off on 8⅝" casing cemented on bottom.

Pure Oil Company's B-4 No. 33 in Section 33-40s-24e in the Aneth area, after drill stem testing of showings, has been abandoned at a depth of 5740 feet.

In the Boundary Butte area, Sunray Mid - Continent Oil Company has graded location for Utah-Navajo-A No. 1 in Section 20-43s-22e.

Southeast of the Four Corners area, Atlantic Oil Company has staked location for a wildcat test, Navajo No. 12, a Gallup test, in the southwest-quarter of Section 29-31s-16w.

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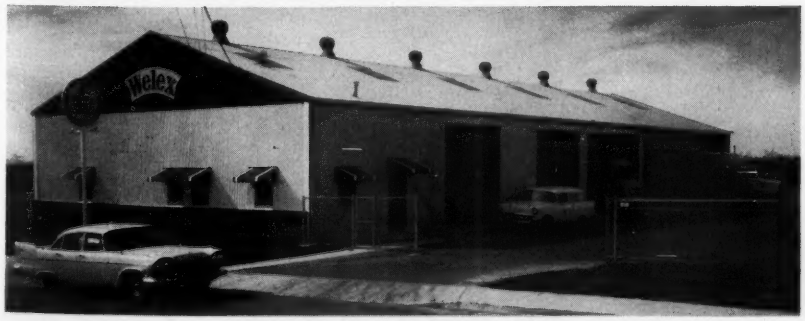

Welex, Inc. Ventura District Office

Welex Opens Two New California Offices

Welex, Inc. had two open houses in October announcing the new locations of district offices in Bakersfield and Ventura. The Ventura district, which also handles offshore operations, is located at 1301 Callens Road, phone Miller 2-2117. Gay Rieder is district manager. The Bakersfield district office is at 3910 Chester Avenue, phone Fairview 7-3844. Harry Pegors is district manager, with Billy Crice sales engineer. The Welex, Inc. division office is located in Los Angeles, California with Herb Woodard as division manager and J. E. Stough assistant division manager.

LAUGH

The couple had just been rescued from a tiny island after three days and nights. The girl extended her hand to the man and said, "Charlie, you're a dear, and thanks for being such a gentleman. Too bad you didn't know this gun was empty, isn't it?"

THIS

It takes less time to do a thing right than it does to explain why you did it wrong.

Boss: "I suppose you know when quitting time is?"

Secretary: "Oh, certainly. Whenever somebody knocks on the door."

FIGURE 300
O-Ring seal, ¼" through 12", to 10,000 psi working pressure.

FIGURE 303
Mis-aligning; O-Ring seal, 1" through 6", to 5000 psi working pressure.

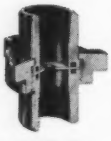

FIGURE 400
Choke union; O-Ring seal, ½" through 4", to 3000 psi working pressure.

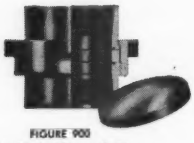

FIGURE 900
Line blind; O-Ring seal, 1" through 12", 2000 psi working pressure.

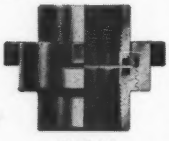

FIGURE 110
Insulated; O-Ring seal, ⅛" through 6", to 3000 psi working pressure.

FIGURE 800
Heavy duty, metal-to-metal seal, ¼" through 8", to 10,000 psi working pressure.

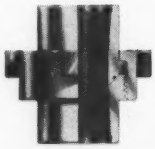

FIGURE 800-R
Heavy duty, O-Ring and metal-to-metal seal, 1¼" through 12", to 10,000 psi working pressure.

"Compared to the complete rig, a union is a mighty small item. But man, the trouble and time they can cost you if they don't do the job they're supposed to do, when they're supposed to do it.

"We used to lose a lot of time because of unions, and it was especially bad when we had a special job like cementing or acidizing. But that's all in the past since my pushers equipped their rigs with these unions. They just don't do nothing but hold.

"And while I'm on the subject, I sure do like to see those cementing and acidizing trucks fitted out with these unions. They make up so fast and easy, and I know they're not going to start leaking when the pressure's on."

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A woman whose doctor had prescribed one of the new tranquilizing drugs for her was telling a man about it at a party.

"I take one pill a day," she said. "It soothes me, chases all the jitters away, improves my appetite and makes me really feel like living."

The man shook his head in wonder, then turned to the other guests and shouted: "Hey, gang, guess what they have on the market now? Instant martinis."

An old man from the hill country took his first trip to a large city. Walking into one of the skyscrapers he saw a doorman standing by a special kind of door. An old lady stepped in, a light flashed red, and she was gone. A moment later the elevator descended, the door opened, and out stepped a beautiful young girl.

"By golly," said the old man, blinking his eyes. "I should have brought the old woman with me."

"What has 12 legs, green eyes and a yellow body with red stripes?"

"I don't know. Why?"

"It's crawling around your neck."

The lady was stepping from the shower and was about to reach for a towel when she caught sight of a window washer taking in all her charms. She was too stunned to move, just stood staring at the man.

"Whatcha lookin' at, lady?" he finally asked. "Aintcha never seen a window washer before?"

Too many of us want our cake and somebody's else's cookie, too.

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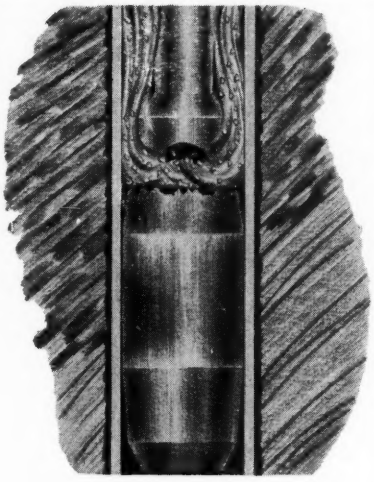

The McCullough Bridge Plug drills out easily. Average time usually runs from one to two hours. Best results have been obtained by using a regular rock bit with about one point of weight, rotating at high R.P.M. Cable tools should not be used for drilling out.

Unusual Application of McCullough Plug Shuts Off Bottom Hole Water

A production packer with 2.688" I.D. mandrel was set at 5600'. Well had been squeezed through the packer and was producing from perforations just above.

The squeeze job later failed and the well started making water through the packer mandrel. A 1¾" O.D. McCullough Bridge Plug was set in the mandrel and cement was dumped on top of the plug with a 1¾" O.D. McCullough Dump Bailer. Water shut-off was successful and the well was put back on production.

Jobs like this demonstrate the versatility of McCullough's line of Bridge Plugs. Wherever a plugging problem exists, there is a McCullough Plug to solve it.

Solid Aluminum Bridge Plug Assures Positive Seal

Set in 1951, a McCullough 4½" O.D. Bridge Plug Was Re-tested in 1956 to 5500 lbs. —Without Leakage

Seldom, in an oil well, is it possible to determine the reliability of a service performed five years previously.

This well, drilled in 1951, was cased through the pay zone with 5½" O.D. 17 lb. cemented casing. A 4½" O.D. McCullough all-metal Bridge Plug was set below the pay and the formation was squeezed for water shut-off. No cement was dumped on top of the plug. The pay zone was perforated and the well put on production.

Late in 1956 water broke into the well. The operator ran in with a squeeze tool and tested the McCullough Plug at 5500 lbs. After five years it still provided a leak-proof seal.

"runs faster"
"sets easier"
"seals securely"
"drills out quickly"

McCullough Bridge Plugs have no hardened parts—no moving parts. They are made of drillable aluminum metal. Slips, reins, rubber packers, etc. have all been eliminated. Ideal for either permanent or temporary plugging operations. Available in 37 sizes to plug in tubing, drill pipe, casing and in open hole in hard formations.

Another 4½" O.D. McCullough Bridge Plug was set just above the perforations at 8150'. Again, no cement was dumped on the plug. This zone was also squeezed with 5500 lbs. pressure. The plug was secure and leak-proof.

It required 2½ hours to run and set the plug which was drilled out three days later in 1½ hours with a rotary rock bit.

McCullough Bridge Plugs are favorites with operators and squeeze tool men. They will withstand as much hydrostatic pressure as the casing and will last as long as the casing.

The jobs described above are certified to be true field reports of services rendered.

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